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(54) **Bone cutting guide**

Knochenschnittführungseinheit

Guide de coupe d'un os

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ting the rotation lock to allow 5° rotation. With the knee in 90° flexion the apparatus is again inserted as shown in Figure 13 and the jaws are distracted to a similar tension to that used in the previous extension position, as shown in Figure 12.

[0065] As in extension the breakaway torque wrench is again used to limit the amount of load placed on the ligaments during this part of the procedure, although, in Figure 13, the key 17 is shown in position.

[0066] Imbalance can be read from the scale 11 on the head 4 and if the lateral and medial ligaments are imbalanced, as shown in Figure 14, the appropriate soft tissue release operation is again carried out.

[0067] The correction of a significant flexion imbalance will affect the gap size between the proximal cut tibia 40 and the distal cut femur 50 in extension. If this correction is necessary, it is essential to repeat the step of resetting the height of the drill guides and tensioning the knee in extension before proceeding to drill the peg drill holes in flexion. The balanced joint is shown in Figure 15.

[0068] Anterior and posterior femur and anterior and posterior chamfer resection is carried out as follows. When preparing to peg drill, as shown in Figure 16, it is essential to ensure that the knee is held in position at 90° flexion. This will help ensure the femoral cutting guide is correctly positioned in the A-P plane on the cut distal face.

[0069] A visual check can be made using the 90° angle on the I-M rod as a guide.

[0070] Maintaining the correct tension (the same as or slightly less than the tension set in extension) the peg holes are drilled with a 3.2 mm drill, indicated by reference numeral 70 in Figure 16, by drilling through the drill guides 27, the drill bits again acting as location means for the cutting guide.

[0071] The size of the femoral component is based upon achieving the correct anterior cut and the desire to restore and maintain a balance patello-femoral articulation.

[0072] A cutting guide suitable for this operation is shown in Figures 17 and 18 and comprises a body portion 71 provided with pairs of alternative cutting slots 72, 73, 74 and 75. In order to clarify the drawing the openings to receive the drill pins 70 and the drill pins 70 themselves are omitted in Figure 18. Alternative pairs of openings are provided to accommodate the alternative cutting slots 72, 73, 74 and 75. The different cuts are indicated in Figure 17 by reference numerals 77, 78 and 79 but only one pair of openings 76 are shown in Figure 17. The body portion 71 has angled sides 80 and additional openings 81 to receive further drills or fixing pins 82 to further secure the cutting guide in place.

[0073] The anterior cut 78 can be anticipated by inserting a femoral sizing indicator or a 0.9 mm saw blade 83 through the side of an anterior slot 72 on the cutting guide or femoral sizing guide as shown in Figures 18 and 19. The appropriate size of the cutting guide is se-

lected.

[0074] Once the correct size of cutting guide has been chosen it is assembled into the drill 70 by engaging openings 76, drills 82 can be added through the holes 81 on the side of the guide for secure fixation as shown in Figure 17.

[0075] When the cutting guide is secure femoral cuts are made with an oscillating saw and saw blade as shown in Figure 18 using saw cutting slots, for example 72.

[0076] The femoral and tibial preparation can then be continued in known manner for the acceptance of the prosthesis.

[0077] As described above drill bits are used as first location means for the cutting guides but alternatively the drill guides can be formed to accept screws, nails, rods or pins which can act as location elements.

[0078] In the construction of the apparatus as described above and as shown in Figures 1 to 18 the first location means to locate the cutting guide are in the form of elongate elements which co-operate with second location means on the cutting guide which are in the form of openings. In an alternative construction however the first location means can be provided by an opening in the bone and the second location means can be provided on the cutting guide by an abutment which is dimensioned to locate in the opening in the bone.

[0079] Thus, the same apparatus can be used for tensing and providing the guide means as described in the preceding Figures but it is used in a different way. The cutting guide however is of different construction. An appropriate cutting guide is shown in Figure 19 and in which the same reference numerals are used to indicate the same parts as the cutting guide shown in Figures 17 and 18. In this construction however the cutting guide 90 is provided with a pair of abutments 91 which project from its rear face 92. The abutments 91 are dimensioned and spaced to locate in drilled openings 93 in the bone 50.

[0080] With this arrangement therefore the operating technique is the same as that described with regard to Figures 1 to 18 but when drills 54 and 80 are used to drill into the bone they are not left in place to act as the first location means but are removed. The holes 93 provided by the drills, and as shown in Figure 19, act as the first location means themselves, the second location means being provided by the abutments 91 on the cutting guide 90.

## Claims

1. Surgical apparatus comprising a base (1), first and second tissue engaging means (2,5) mounted on said base (1) and being displaceable towards and away from each other, one (5) of said tissue engaging means (2,5) being adapted to be orientated by the tissue engaged thereby and guide means (27)

- adjustable in relation to said base (1) and one (5) of said tissue engaging means (2,5) for positioning first location means (54,70,93) to locate a cutting guide (60,71,90) provided with co-operating second location means (61-63,76,91) on a bone to be re-sectioned.
2. Surgical apparatus as claimed in claim 1 in which said guide means (27) include a guide bore (28).
  3. Surgical apparatus as claimed in claim 2 in which said guide bore (28) is dimensioned to receive said first location means which is an elongate element (54, 70) to be inserted into said bone.
  4. Surgical apparatus as claimed in claim 3 in which said elongate element (54, 70) is a drill, screw, nail or pin.
  5. Surgical apparatus as claimed in claim 3 or claim 4 in which the second location means is provided by a location opening (61-63,76) in said cutting guide (60,71).
  6. Surgical apparatus as claimed in claim 2 in which said first location means is an opening (93) in said bone which can be formed by an elongate forming means guided through said guide bore (28).
  7. Surgical apparatus as claimed in claim 6 in which said second location means is provided by an abutment (91) on said cutting guide (90) which is dimensioned to locate in said opening (93) in said bone.
  8. Surgical apparatus as claimed in any one of preceding claims 1 to 7 in which said cutting guide (60, 71, 90) is provided with additional openings (66,81) to receive attachment elements (82) to further locate it on said bone.
  9. Surgical apparatus as claimed in any one of the preceding claims 1 to 8 in which the tissue engaging means (2,5) each include a tissue engaging surface (3,6), each of said tissue engaging surfaces (3,6) being arranged so that it faces away from the other.
  10. Surgical apparatus as claimed in any one of the preceding claims 1 to 9 in which said guide means (27) is arranged to move in relation to the base (1) in accordance with movement of one (6) of the tissue engaging surfaces (3,6).
  11. Surgical apparatus as claimed in claim 10 in which the guide means (27) are carried by the tissue engaging means (2,5).
  12. Surgical apparatus as claimed in claim 10 in which said guide means (27) are movably located on the base (1) and can be moved in only one direction by the tissue engaging means (2,5).
  13. Surgical apparatus as claimed in any one of the preceding claims 1 to 12 in which said guide means (27) is carried by a releasable ratchet locking means (18).
  14. Surgical apparatus as claimed in any one of the preceding claims 1 to 13 in which two guide means (27) are included, arranged in spaced apart relationship in relation to one of said tissue engaging means (2,5).
  15. Surgical apparatus as claimed in any one of the preceding claims 1 to 14 in which the first tissue engaging means (2) is located in fixed relationship to the base (1) and said second tissue engaging means (5) can move in relation to said base (1), said second tissue engaging means (5) comprising a movable head (4) carrying a tissue engaging element provided with a tissue engaging surface (6) and said guide means (27) being carried on or moved by engaging said movable head (4).
  16. Surgical apparatus as claimed in claim 15 in which said guide means (27) can engage the movable head (4) and is carried on a support movably mounted on the base (1).
  17. Surgical apparatus as claimed in any one of the preceding claims in which the second tissue engaging means (5) is adapted to be orientated by the tissue engaged thereby, the movement being rotatable.
  18. Surgical apparatus as claimed in claim 17 in which said tissue engaging means (5) is carried by a rotatable spindle (7) mounted in said movable head (4).
  19. Surgical apparatus as claimed in claim 18 including means (12) for locking said second tissue engaging means (5) in two or more angular positions.
  20. Surgical apparatus as claimed in any one of preceding claims 17, 18 or 19 including measuring means (9-11) to measure the degree of rotary deflection of said second tissue engaging surface (6) away from a position of parallelism with the first tissue engaging surface (3) when first and second tissue engaging surfaces (3,6) engage the tissue.
  21. Surgical apparatus as claimed in any one of the preceding claims including means (14-17) to displace the tissue engaging means (2,5) away from each other and which include a geared drive.
  22. Surgical apparatus as claimed in claim 21 in which

said geared drive includes a rack (15) and pinion assembly.

#### Patentansprüche

1. Chirurgische Vorrichtung, umfassend einen Fuß (1), eine erste und zweite Gewebeeingriffseinrichtung (2,5), die auf dem Fuß (1) angebracht und aufeinander zu und voneinander weg verlagerbar sind, wobei eine (5) der Gewebeeingriffseinrichtungen (2,5) angepasst ist, um durch das Gewebe, das damit in Eingriff tritt, ausgerichtet zu werden, sowie Führungseinrichtungen (27), die in Bezug zu dem Fuß (1) und einer (5) der Gewebeeingriffseinrichtungen (2,5) verstellbar sind, zur Platzierung einer ersten Positioniereinrichtung (54,70,93), um eine mit einer damit zusammenwirkenden zweiten Positioniereinrichtung (61-63,76,91) versehene Schneidföhrung (60,71,90) auf einem zu resezierenden Knochen örtlich festzulegen.
2. Chirurgische Vorrichtung nach Anspruch 1, bei der die Führungseinrichtungen (27) eine Führungsbohrung (28) einschließen.
3. Chirurgische Vorrichtung nach Anspruch 2, bei der die Führungsbohrung (28) bemessen ist, um die erste Positioniereinrichtung aufzunehmen, die ein langgestrecktes Element (54,70) ist, das in den Knochen eingeföhrt werden soll.
4. Chirurgische Vorrichtung nach Anspruch 3, bei der das langgestreckte Element (54,70) ein Bohrer, eine Schraube, ein Nagel oder ein Stift ist.
5. Chirurgische Vorrichtung nach Anspruch 3 oder Anspruch 4, bei der die zweite Positioniereinrichtung mit einer Positionieröffnung (61-63,76) in der Schneidföhrung (60,71) versehen ist.
6. Chirurgische Vorrichtung nach Anspruch 2, bei der die erste Positioniereinrichtung eine Öffnung (93) im Knochen ist, die von einer durch die Führungsbohrung (28) geföhrtten langgestreckten Bildungseinrichtung gebildet werden kann.
7. Chirurgische Vorrichtung nach Anspruch 6, bei der die zweite Positioniereinrichtung von einem Widerlager (91) auf der Schneidföhrung (90) bereitgestellt wird, das bemessen ist, um es in der Öffnung (93) im Knochen örtlich festzulegen.
8. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 7, bei der die Schneidföhrung (60,71,90) mit zusätzlichen Öffnungen (66,81) versehen ist, um Zubehörfelle (82) aufzunehmen, um sie weiter auf dem Knochen örtlich festzulegen.
9. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 8, bei der die Gewebeeingriffseinrichtungen (2,5) jeweils eine Gewebeeingriffsoberfläche (3,6) einschließen, wobei jede der Gewebeeingriffsoberflächen (3,6) so angeordnet ist, dass sie von der anderen abgewandt ist.
10. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 9, bei der die Führungseinrichtung (27) angeordnet ist, um sich entsprechend einer Bewegung von einer (6) der Gewebeeingriffsoberflächen (3,6) in Bezug zum Fuß (1) zu bewegen.
11. Chirurgische Vorrichtung nach Anspruch 10, bei der die Führungseinrichtungen (27) von den Gewebeeingriffseinrichtungen (2,5) getragen werden.
12. Chirurgische Vorrichtung nach Anspruch 10, bei der die Führungseinrichtungen (27) beweglich auf dem Fuß (1) angeordnet sind und von den Gewebeeingriffseinrichtungen (2,5) in nur einer Richtung bewegt werden können.
13. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 12, bei der die Führungseinrichtung (27) von einer lösbaren Zahngesperreinrichtung (18) getragen wird.
14. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 13, in der zwei Führungseinrichtungen (27) enthalten sind, die in Bezug zu einer der Gewebeeingriffseinrichtungen (2,5) in einer Abstandsbeziehung angeordnet sind.
15. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 14, bei der die erste Gewebeeingriffseinrichtung (2) in einer feststehenden Beziehung zu dem Fuß (1) angeordnet ist und sich die zweite Gewebeeingriffseinrichtung (5) in Bezug zum Fuß (1) bewegen kann, wobei die zweite Gewebeeingriffseinrichtung (5) einen beweglichen Kopf (4) umfasst, der ein mit einer Gewebeeingriffsoberfläche (6) versehenes Gewebeeingriffselement trägt, und die Führungseinrichtung (27) auf dem beweglichen Kopf (4) getragen wird oder durch Eingriff mit dem beweglichen Kopf (4) bewegt wird.
16. Chirurgische Vorrichtung nach Anspruch 15, bei der die Führungseinrichtung (27) mit dem beweglichen Kopf (4) in Eingriff treten kann und auf einer beweglich auf dem Fuß (1) montierten Halterung getragen wird.
17. Chirurgische Vorrichtung nach einem der vorangehenden Ansprüche, bei der die zweite Gewebeeingriffseinrichtung (5) angepasst ist, um sie durch das damit in Eingriff tretende Gewebe auszurichten, wo-